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(54) Title: FERTILIZER

(57) Abstract

An organic fertilizer is produced by adding biomix to seaweed, which is preferably in artificially dried particulate form, e.g. milled or granular dry seaweed, and autoclaving the resulting mixture, preferably with agitation, at a temperature of at least 80°C and a pressure of 50 to 100 psig (446 to 791 kPa) for a suitable period, typically 4 to 6 hours, followed by cooling, preferably with the agitation being continued during at least part of the cooling step. The mixture is then allowed to settle, preferably after being expelled, e.g. by compressed air, into a settling tank, and the supernatant liquid product is moved, e.g. by decantation, and may be filtered if necessary and if desired dehydrated to produce a concentrate.

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FERTILIZER

This invention relates to fertilizers containing seaweed. Such fertilizers, which are well known, contain not only the principal plant nutrients nitrogen, phosphorus and potash (NPK) but also valuable trace elements such as boron, sulphur, cobalt, copper, iron, magnesium, manganese, molybdenum, sodium, zinc and the halogens chlorine, bromine and iodine. However, having regard to the needs of plants, provision of required amounts of NPK will give unnecessarily large amounts of the trace elements. Seaweed fertilizers can be augmented with inorganic sources of NPK, but this makes them of no appeal to the growing numbers of organic gardeners, horticulturalists and farmers.

The anaerobic digestion of organic materials of vegetable and animal origin, particularly the droppings of horses, cattle and poultry, results in the production of a fluid that is rich in assimilable NPK, as well as being substantially odourless. This fluid is known in the art and referred to herein 15 as "biomix".

In accordance with the present invention, an organic fertilizer is produced by adding biomix to seaweed, which is preferably in artificially dried particulate form, e.g. milled or granular ~~dry seaweed~~, and autoclaving the resulting mixture, preferably with agitation, at a temperature of at 20 least 80 °C and a pressure of 50 to 100 psig (446 to 791 kPa) for a suitable period, typically 4 to 6 hours, followed by cooling, preferably with the agitation being continued during at least part of the cooling step. The mixture is then allowed to settle, preferably after being expelled, e.g. by compressed air, into a settling tank, and the supernatant liquid product is 25 removed, e.g. by decantation, and may be filtered if necessary.

The milled dried seaweed may previously have been saturated with water by soaking for up to 12 hours, ~~and then crushed~~, e.g. between rollers, to form a pulp.

The volume of biomix is preferably 4 to 8 (e.g. about 6) times the 30 volume of dried seaweed. If seaweed pulp is used, this will itself have about 3 times the volume of the dried seaweed that it has been prepared

from. Before autoclaving, the mixture of biomix and seaweed may be allowed to stand for from 2 to 12 hours, to facilitate extraction of nutrients with the liquid and hence reduction of the time and energy expended in autoclaving. The period of standing must not be long enough to allow any 5 degradation of the material. The preferred autoclave pressure is 70 to 90, e.g. about 80, psig (584 to 722, e.g. about 653, kPa) and the preferred temperature 90 to 105 °C.

The product obtained by the process of the present invention is a liquid containing all crop nutrients required by plants. It is completely 10 organic and can be applied to agricultural, horticultural, orchard, garden and greenhouse plants as a foliar spray or soil fertilizer, or in hydroponic culture. The product can if desired be dehydrated to facilitate transport, being readily rehydrated by addition of water.



CLAIMS

1. A method of producing an organic fertilizer comprising adding biomix, viz. the fluid obtained by anaerobic digestion of organic materials of vegetable and animal origin, to seaweed; autoclaving the resulting mixture at a temperature of at least 80 °C and a pressure of from 446 to 791 kPa for a suitable period, cooling the mixture, allowing it to settle, and removing the supernatant liquid as the desired product.
2. A method as claimed in Claim 1 in which the seaweed is in artificially dried particulate form.
3. A method as claimed in Claim 2 in which the dried seaweed has been saturated with water by soaking for up to 12 hours and then crushed to a pulp, and the biomix is added to the pulp.
4. A method as claimed in any preceding claim in which 4 to 8 volumes of biomix is used per volume of dried seaweed.
5. A method as claimed in any preceding claim in which the mixture is agitated during autoclaving and at least part of the cooling step.
6. A method as claimed in any preceding claim in which the autoclaving takes place over 4 to 6 hours.
7. A method as claimed in any preceding claim in which the product is filtered.
8. A method as claimed in any preceding claim in which the mixture of biomix and seaweed is allowed to stand for from 2 to 12 hours before autoclaving, to facilitate extraction of nutrients.
9. A method as claimed in any preceding claim in which the autoclave pressure is 584 to 722 kPa and the temperature 90 to 105 °C.



10. A method as claimed in any preceding claim including the further step of dehydrating the product to produce a rehydratable concentrated fertilizer.
11. An organic fertilizer obtained by a method as claimed in any preceding claim.



INTERNATIONAL SEARCH REPORT

International Application No PCT/GB 84/00407

I. CLASSIFICATION OF SUBJECT MATTER (If several classification symbols apply, indicate all)⁶

According to International Patent Classification (IPC) or to both National Classification and IPC

IPC⁴ : C 05 F 11/00

II. FIELDS SEARCHED

Minimum Documentation Searched⁷

Classification System	Classification Symbols
IPC ⁴	C 05 F; C 05 G

Documentation Searched other than Minimum Documentation
to the Extent that such Documents are Included in the Fields Searched⁸

III. DOCUMENTS CONSIDERED TO BE RELEVANT⁹

Category ¹⁰	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
A	GB, A, 664989 (PLANT PROD. LTD.) 16 January 1952 see claims --	1
A	GB, A, 2031258 (J.D. WRIGHT & CY.) 23 April 1980 see the entire document --	1
A	Chemical Abstracts, vol. 62, 1965 (Columbus, Ohio, US) K.M. Ramanathan et al.: "Composting of seaweeds", see column 15379d, & Madras Agr. J. 51(11), 451-7(1964) (Eng.) --	
A	DE, A, 1592577 (BÖTTGER) 14 January 1971 see the entire document --	1, 2
A	DE, A, 2354270 (A. HÖHN) 7 May 1975 see page 3, line 20 - page 4, line 8 --	1
A	US, A, 4336051 (J.U. MARQUEZ) 22 June 1982 --	./.

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IV. CERTIFICATION

Date of the Actual Completion of the International Search

6th March 1985

Date of Mailing of this International Search Report

22 AVR. 1985

International Searching Authority

EUROPEAN PATENT OFFICE

Signature of Authorized Officer

G.L.M. Krudenberg

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)		
Category	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No.
A	DE, A, 1008758 (APPICAT. BIOLOGIQUES) 23 May 1957 --	
P,X	GB, A, 2129785 (A. COOKE) 23 May 1984 see page 1, lines 49-74 -----	1-11

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON

INTERNATIONAL APPLICATION NO. PCT/GB 8400407 (SA 8395)

This Annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the European Patent Office EDP file on 11/04/85

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
GB-A- 664989		None	
GB-A- 2031258	23/04/80	None	
DE-A- 1592577	14/01/71	None	
DE-A- 2354270	07/05/75	None	
US-A- 4336051	22/06/82	None	
DE-A- 1008758		None	
GB-A- 2129785	23/05/84	None	

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